OEM-PRESSURE SENSOR RES15

RES15 OEM pressure sensors are particularly suitable for system and instrument manufacturers. They are versatile in application and can be used to measure pressures from 20 to 1000 bar_{abs}. in liquids and gases in three temperature ranges between - 40°C and 150°C.
These sensors meet the highest measuring requirements by reason of their high natural frequency, good attenuation behavior, excellent linearity, combined with negligible hysteresis and high reproducibility.

- ***Corrosion resistant diaphragm***
- ***High accuracy***
- ***Excellent long term stability***
- ***Very low temperature drift***
- ***Measuring ranges from 20 to 1000 bar***
- ***Absolute pressure***
- ***Low power consumption***
- ***Open Wheatstone bridge***



RES15 Sensors are built to measure absolute pressure. They contain a highly stable piezoresistive silicon measuring cell and are suitable for a constant current supply of 0,5 to 5mA.

Applications

These pressure sensors can be used for the widest variety of applications in industrial automation as well as in measuring instruments.

Examples:

- Pressure transmitters
- Analyzers for physical units
- Deep well probes for oil exploration
- Instrumentation for aerospace technology
- Brake systems for automotive and railway industry
- Down hole probes for oil exploration
- R & D projects
- Hydraulic equipment manufacturing

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All information is the best representation of actual knowledge. All data is subject to change. Kristal does not assume any liability arising out of the application or use of any product or circuit described herein.

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Technical Data

Type	**RES15**	**A 20**	**A 50**	**A 100**	**A 200**	**A 500**	**A 1000**
Range	bar abs.	0...20	0...50	0...100	0...200	0...500	0...1000
Overload	bar abs.	60	150	250	500	1250	1250
Burst pressure	bar abs.	>60	>150	>250	>500	>1250	>1250
Threshold	mbar	<10	<25	<50	<100	<250	<250
Sensitivity (nominal)	mV/bar	15...40	6...16	3...8	1,5...4	0,6...1,6	0,6...1,6

Full scale signal (FSO) @ 4mA		mV	300-800	(600-1600 for 1000 bar)
Linearity (BSL) **& hysteresis**		%FSO	≤±0,25	
Repeatability		%	≤0,1	
Stability:	of sensitivity	%/a	≤0,2	
	of zero	%FSO/a	≤0,3	

			Standard	**L-Type**	**H-Type**
Operating temperature range		°C	0...120°C	-40...70°C	20...140°C
Minimal/maximal temperature		°C	-10...140°C	-40...80°C	10...150°C
Reference temperature		°C	25		
Thermal sensitivity shift**					
RES15	0...100°C	%	-0,5...+1,5		
RES15 L	-20...50°C	%	-0,5...+1,0	(-40...-20°C	0...+3,0%)
RES15 H	20...120°C	%	≤±1,0		
Thermal zero shift**					
RES15	0...100°C	%FSO	≤±0,5		
RES15 L	-20...50°C	%FSO	≤±0,5	(-40...-20°C	±1,0%FSO)
RES15 H	20...120°C	%FSO	≤±0,5		

Zero measurand output **(@ 4mA)	mV	≤±20
Excitation (constant current)	mA	4 (0,5...5)
max. voltage	V	<26
Output impedance	kΩ	2,2...5,2
Shock resistance	***g***	1000
Insulation resistance	MΩ	>100
Proof tension	$V_{eff.}$	500
Mass	g	15

Materials

housing	1.4435 (AISI 316 L) or (V62) Hastelloy-C 276	
diaphragm	1.4435 (AISI 316 L) or (V61 and V62) Hastelloy-C276, 25 µm	
gasket	FPM (Viton)/ Back-up ring PTFE (Standard-Type) MVQ(L-Type)	
potting compound	none	
oil filling	Wacker AK100	
electrical connection	V61/V62/V63	5 x 0,09 mm^2, l = 300 mm, Siliflex AWG24, ø outside 0,95 mm
	V71/V72/V73	pins ø 0.8mm

Measuring Principle

The pressure to be measured acts through thin corrosion resistant steel diaphragm on a silicon measuring element. The pressure transmitting medium is silicon oil. The measuring element contains diffused piezoresistive resistances which are connected into a Wheatstone bridge.

Excitation and Temperature Compensation

The calibration data are based on a ***constant current excitation of 4mA***. A supply of between ***0,5mA and 5mA*** is possible. However, the sensitivity and FSO signal respectively along with the zero measurand signal vary in proportion to the supply current. The sensors are designed and manufactured for use in three operating temperature ranges between -40...150°C and are provided with thermal compensation.
The resulting resistance values for compensation of zero and sensitivity shift are documented in a measurement protocol which is scope of the supply. The resistors will have to be placed adequately on the amplifier board by the user.

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Analog Temperature Compensation

The piezoresistive pressure sensors are pre-aged before calibration with pressure and temperature cycles. They are then subjected to a computer-controlled stability-test program lasting for several days. Finally the pressure sensors are precisely calibrated with a 4mA supply current. Resistance values determined for the zero point and sensitivity compensation as well as the zero offset are ***documented in the compensation print-out*** supplied with the sensors.

*Digital Temperature Compensation**

For even better compensation of temperature and linearity, the sensors can be supplied with a set of polynomial coefficients for digital compensation. Depending on the measuring and temperature ranges as well as the order of the polynomial, ***the error can be reduced to 0,1%FS.*** Data sheet A9.01e provides accurate details in this respect. ***These types of sensors are made customer specific.***

Signal Processing and Connections

These sensors are delivered uncompensated. This offers the possibility to the user to compensate sensor and electronic together.
The output signal is the differential output of the Wheatstone bridge. It has to be processed by a differential amplifier with symmetrical input.
On request, KRISTAL delivers custom made electronic units to OEM customers such as amplifier type 4670V or complete transmitters with standardized industrial output signals.

Installation

It is essential to comply with the following points when installing the sensor:
- Check that your housing will withstand the required pressure rating.
- Insure that the O-Ring seal is inserted and that it is compatible with the medium.
- As far as possible, protect the diaphragm, which is very thin and must not be damaged.
- Always fit the sensor into a suitable hole ø 15 H7.
- Note the sensor connections.

Ordering Code

RES15	AxxxxB	x Vxxx		OEM Sensor
	A			Absolute pressure
	20*			Range in bar
	50*			
	100			
	200			
	500			
	1000			
		B		bar
		-	Standard	Temperature 0...120°C
		L*	L-Type	Temperature –40...70°C
		H*	H-Type	Temperature 20...150°C
			---	Stainless diaphragm
			V61	Hastelloy-C diaphragm with wires
			V62*	Hastelloy-C full with wires
			V63*	Titanium full with wires
			V71	Hastelloy-C diaphragm with pins
			V72*	Hastelloy-C full with pins
			V73*	Titanium full with pins
			Vxxx	customer specific

***** on request
****** only with compensated sensors

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Compensation sheet with electrical connections

PIEZORESISTIVE SN : 960232
PRESSURE SENSOR
Type : RES15A200BLV61
Range : 200 bar absolute
Overload : 500 bar absolute

COMPENSATION:		RE:	30 kOhm
Rp+	300 kOhm	Rso+	3.3 Ohm
Rp-		Rso-	

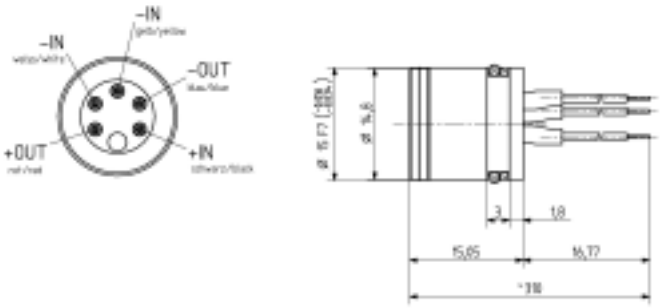
CALIBRATION DATA with 4mA supply :

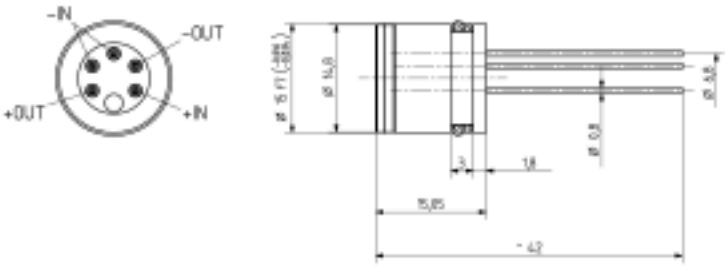
Temp. (°C)	-24.3	-0.3	63.7
NP uncomp. (mV)	-28.5	-32.2	-41.0
E uncomp. (mV/bar)	2.90	2.87	2.91
NP comp. (mV)	0.9	-0.2	1.3
E comp. (mV/bar)	2.83	2.79	2.82

+In(Pin1)=black
-In(Pin3)= white
-In(Pin2)= yellow
+Out(Pin5)=red
- Out(Pin4)=blue

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Dimensions





Installation Proposals

Note:
Influence of static and dynamic pressure changes need to be considered at all time.

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